HIGH POWER FIBER LASER WITH EYE SAFE WAVELENGTHS

ABSTRACT OF THE INVENTION

[0029] A relatively high power fiber laser with an output wavelength in a spectral region considered to be "eye-safe" is disclosed. The high power fiber laser includes one or more fiber lasers that are fiber coupled, bundled and tapered into a multi-mode fiber. The multi-mode fiber is coupled into a hollow core, photonic band gap optical fiber filled with a Raman medium. In particular, fiber lasers formed from Yttrebium fibers having a nominal output wavelength of 1060-1120 nanometers are shifted to the eye-safe wavelength range by way of a hollow core photonic bond gap (PBG) filled with deuterium (D_2) gas. Diode lasers having an output wavelength in the range of 940-980 nanometers can also be shifted to an eye-safe wavelength by direct Raman shifting of fiber coupled diode array to a hollow core PBG fiber filled with hydrogen (H_2 gas). The use of the PBG optical fibers filled with various Raman medium for shifting the output wavelength of high power fiber lasers and diode lasers is relatively simple and inexpensive.